Claims

1、A method of extracting gold from arsenic gold ore concentrate involves the following steps in turn:

(1) Load the arsenic gold ore concentrate and iron powder into the smelting chamber.

(2) Increase the temperature of smelting chamber to 100℃-300℃ and then hold the temperature to remove the vapor and small quantity of dust in the material.

(3) Under residual pressure≤50Pa, increase the temperature of smelting chamber and crystallization chamber to 300-500℃ and then hold the temperature to remove the volatilized arsenic sulfides in the material.

(4) Hold the temperature of crystallization chamber at 300-500℃, increase the temperature of smelting chamber to 500-600℃ and then hold the temperature to remove the gaseous element sulfur decomposed from material.

(5) Increase the temperature of smelting chamber to 600-760℃ and then hold the temperature, meanwhile lower the temperature of crystallization chamber to 270-370℃ and then hold the temperature to let the arsenic vapor generated from material to crystallize in the crystallization chamber and get element arsenic and also get gold-rich slag after dearsenization at the bottom of smelting chamber.

(6) Lower the temperature of smelting chamber and crystallization chamber to below 150℃, charge the air, when the inside and outside air pressures are basically equal, strip arsenic and take out the gold-rich slag after dearsenization.

(7) Extract fine gold from the gold-rich slag got using conventional method.

2、A method of extracting gold from arsenic gold ore concentrate as mentioned in Claim 1, featuring that before material is charged into the

above mentioned smelting chamber, there is a step to crush the arsenic concentrate material into grain size of 0.1mm-2mm.

3、 A method of extracting gold from arsenic gold ore concentrate as mentioned in Claim 1, featuring that the weight of above mentioned iron powder is 2-4% of arsenic concentrate material.

4、 A method of extracting gold from arsenic gold ore concentrate as mentioned in Claim 1, featuring that holding time is 1-2 hours in the above step (2).

5、 A method of extracting gold from arsenic gold ore concentrate as mentioned in Claim 1, featuring that holding time is 1-2 hours in the above step (3).

6、 A method of extracting gold from arsenic gold ore concentrate as mentioned in Claim 1, featuring that holding time is 1-3 hours in the above step (4).

7、 A method of extracting gold from arsenic gold ore concentrate as mentioned in Claim 1, featuring that holding time of smelting chamber and crystallization chamber is respectively 3-7 hours in the above step (5).

8、 A method of extracting gold from arsenic gold ore concentrate as mentioned in Claim 1, featuring that temperature of smelting chamber in the above mentioned step (2) is 200-300℃.

9、 A method of extracting gold from arsenic gold ore concentrate as mentioned in Claim 8, featuring that temperature of smelting chamber in the above mentioned step (2) is 250-300℃.

10、 A method of extracting gold from arsenic gold ore concentrate as mentioned in Claim 1, featuring that temperature of smelting chamber in the above mentioned step (3) is 450-500℃.

11、 A method of extracting gold from arsenic gold ore concentrate as mentioned in Claim 1, featuring that temperature of crystallization chamber in the above mentioned step (3) is 400-450℃。

12、 A method of extracting gold from arsenic gold ore concentrate as mentioned in Claim 1, featuring that temperature of smelting chamber in the above mentioned step (4) is 550-600℃.

13、 A method of extracting gold from arsenic gold ore concentrate as mentioned in Claim 1, featuring that temperature of crystallization chamber in the above mentioned step (4) is 400-450℃.

14、 A method of extracting gold from arsenic gold ore concentrate as mentioned in Claim 1, featuring that temperature of smelting chamber in the above mentioned step (5) is 650-750℃.

15、 A method of extracting gold from arsenic gold ore concentrate as mentioned in Claim 14, featuring that temperature of smelting chamber in the above mentioned step (5) is 700-750℃。

16、 A method of extracting gold from arsenic gold ore concentrate as mentioned in Claim 1, featuring that temperature of crystallization chamber in the above mentioned step (5) is 300-360℃.

17、 A system of extracting gold from arsenic gold ore concentrate, its

feature lies in inclusion of induction heating equipment, smelting device, constant temperature crystallization device, automatic deslagging device, dust collection device, automatic temperature control device, vacuum measuring device and vacuum extraction device. The above mentioned constant temperature crystallization device is fixed on the above mentioned smelting device through demountable device. Its interior smelting chamber is connected with the crystallization chamber of the above mentioned constant temperature crystallization device. Its bottom is connected with the above mentioned automatic deslagging device. The above mentioned smelting device, constant temperature crystallization device and automatic deslagging device have vacuum sealing in between. The above mentioned constant temperature crystallization device is connected with the above mentioned dust collection device through the dust collection inlet pipe. Such dust collection device is connected with the above mentioned vacuum extraction device through pipe equipped with the vacuum measuring device. Inductor on the above mentioned induction heating equipment is arranged on the above mentioned smelting device. The thermal couples of above mentioned automatic temperature control device are respectively mounted on the above mentioned smelting device and constant temperature crystallization device.

18、 A system of extracting gold from arsenic gold ore concentrate as mentioned in Claim 17, featuring that the above mentioned smelting device consists of: crucible formed by detachable bottom (8'), cover (26) and wall (8), vacuum furnace shell (7) assembled outside the crucible, as well as a hollow collecting and exhaust pipe (9) vertically mounted at the center of the above mentioned crucible bottom (8'). The interior wall of the above mentioned crucible and exterior wall of the above mentioned collecting and exhaust pipe (9) form the above mentioned smelting chamber, which connects with the above mentioned crystallization

chamber through the top of the above mentioned collecting and exhaust pipe (9). Many downward slant holes are distributed on the wall of such collecting and exhaust pipe (9). A vapor drainage pipe (1) is also installed under such collecting and exhaust pipe (9), which crosses the above mentioned crucible bottom (8') and connects with an exhaust fan.

19、 A system of extracting gold from arsenic gold ore concentrate as mentioned in Claim 18, featuring that the centerline of each slant hole of the above mentioned collecting and exhaust pipe (9) and the centerline of the above mentioned collecting and exhaust pipe (9) are in the same plane and form 20-40 degree bevel with the lower end face of the above mentioned collecting and exhaust pipe (9).

20、 A system of extracting gold from arsenic gold ore concentrate as mentioned in Claim 18, featuring that the above mentioned crucible is made of corrosion proof and heat conducting material.

21、 A system of extracting gold from arsenic gold ore concentrate as mentioned in Claim 20, featuring that the above mentioned crucible is made of graphite.

22、 A system of extracting gold from arsenic gold ore concentrate as mentioned in Claim 18, featuring that the inductor of the above mentioned induction heating equipment is of intermediate frequency inductor. Such intermediate frequency inductor is in integral cast in the insulating materials and assembled in the vacuum furnace shell (7) outside the above mentioned crucible. The above mentioned induction heating equipment also includes intermediate frequency power, capacitor for electric induction heating system, intermediate frequency isolating transformer. The above mentioned intermediate frequency isolating

transformer is connected between the electric input end of the above mentioned intermediate frequency inductor and intermediate frequency power.

23、 A system of extracting gold from arsenic gold ore concentrate as mentioned in Claim 18, featuring that the inductor of the above mentioned induction heating equipment is of intermediate frequency inductor. Such inductor is assembled outside the above mentioned vacuum furnace shell (7). The above mentioned induction heating equipment also includes intermediate frequency power and capacitor for electric induction heating system.

24、 A system of extracting gold from arsenic gold ore concentrate as mentioned in Claim 23, featuring that the above mentioned vacuum furnace shell (7) is made of high temperature resistant, insulation, non-magnetoconductive, non conducting and non-leakage material.

25、 A system of extracting gold from arsenic gold ore concentrate as mentioned in Claim 24, featuring that the above mentioned vacuum furnace shell (7) is made of ceramic or 4-fluorothene plastic wire mesh.

26、 A system of extracting gold from arsenic gold ore concentrate as mentioned in Claim 23, featuring that insulating material is used to block the gap between the above mentioned crucible wall (8) and the above mentioned vacuum furnace shell (7).

27、 A system of extracting gold from arsenic gold ore concentrate as mentioned in Claim 17, featuring that the above mentioned constant temperature crystallization device includes bottomless shell (14) and inner shell (13), many multi-hole crystallization plates (15) installed on one

support as well as center heating pipe (16) installed on the above mentioned shell (14) and extending at the vertical direction in the center of shell. The space in the above mentioned inner shell 13 forms the above mentioned crystallization chamber. The above mentioned inner shell (13) and support of multi-hole crystallization plate (15) are fixed together with the above mentioned shell (14) through the dismountable device.

28、 A system of extracting gold from arsenic gold ore concentrate as mentioned in Claim 27, featuring that a minor annular slit exists between the shell (14) and inner shell (13) of the above mentioned constant temperature crystallization device. The bottom of the above mentioned annular slit is plugged with refractory materials.

29、 A system of extracting gold from arsenic gold ore concentrate as mentioned in Claim 17, featuring that the above mentioned automatic temperature control device includes: a thermal couple (5) inserted on the crystallization chamber shell (14) for measuring temperature in the crystallization chamber, a thermal couples (5) inserted at the furnace bottom for measuring temperature of smelting chamber, as well as temperature controller connected with the above two thermal couples (5) and the above mentioned induction heating equipment through compensation cord for respectively controlling the temperature in the furnace and crystallization chamber.

30、 A system of extracting gold from arsenic gold ore concentrate as mentioned in Claim 17, featuring that the above mentioned smelting device is installed above the ground through support (24). Such smelting device also includes a furnace bottom (6) fixed with the above mentioned crucible bottom (8'); the above mentioned automatic deslagging device includes: hopper (4), slag car (3) as well as hydraulic lift (2) installed on

the hopper. The above mentioned furnace bottom (6) is connected with vacuum furnace shell (7) through top support of the hydraulic lift (2), between which the vacuum sealing strips are used for vacuum sealing. Upon lowering, such hydraulic lift (2) can separate the above mentioned furnace bottom (6) and the above mentioned crucible bottom (8') from the above mentioned crucible wall (8).

31、 A system of extracting gold from arsenic gold ore concentrate as mentioned in Claim 30, featuring that a layer of heat insulation material is arranged between the above mentioned crucible bottom (8') and the above mentioned furnace bottom (6).